PATENT SPECIFICATION

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COMPLETE SPECIFICATION

A Device for effecting the Relative Displacement of the Die Components of a Riveting Machine

We, HEINRICH WALDES, IGNAZ PUC, and SIGMUND WALDES, all citizens of Czecho-Slovakia, trading as Waldes & Ko., of Kleine Plauensche Gasse 39, Dresden A, Germany, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a device for effecting the relative displacements of the die components of a riveting machine of the type comprising an outer, hollow die component housing an inner split-die component, used, for example, for securing the spherical stud member of a press button fastener to a fabric. For this purpose it is usual to employ a hollow rivet stem uprising from a base portion, which stem is caused to penetrate the fabric and enter the hollow spherical member and is so deformed by the riveting pressure that it is bulged outwardly to fit closely the internal wall of said spherical member. An example of such a spherical stud member of a press button fastener is described in the prior specification 482,977.

The working parts of the riveting machine used for said purpose include a lower die member on which a rivet stem is placed and an upper die member provided with a spherical cavity for carrying the hollow spherical member of a press button fastener during the riveting action. The upper die member consists of an outer hollow die component and an inner component movable and guided therein, which inner component including said spherical cavity is partly slit so that its lower end forms two gripping jaws and the component operates as tongs. The gripping movements of the tongs are controlled by the aid of the relative movement of the hollow die component and tongs guided therein.

Heretofore the control was so effected that the tongs were detained relatively to the hollow die component by a brake, whereby in its descent the hollow die component was able to bear with an inclined face against correspondingly inclined faces on the tongs to close the latter. On the upward movement of the hollow die component the opening was effected by the braking of the tongs; the hollow die component being displaced relatively to the tongs, whereupon pressure on the jaws of the tongs ceased and the tongs were free to open.

The vertical reciprocation of the hollow die component was effected by the lever H, Fig. 2. Its movement was transmitted through linkages to the hollow component *Sch.* in a bore in which the tongs Z were mounted for displacement in a suitably dimensioned slideway. On the descent of the hollow component normally the tongs Z also descended, and *vice versa* with the ascent of the hollow component. When, however, the component Z was retained there was effected a shift of Z relatively to the hollow component *Sch.* For retaining the tongs Z there served a braking device W one member of which was secured to the tongs Z while the other member was guided in a vertical slideway. Fitted to its end face was a brake block B which with the aid of a set-screw *St.* could be pressed more or less powerfully against the co-operating face of the braking device.

By the braking action the tongs Z were retained relatively to the hollow component *Sch*, and, in this way, on the up and down movement of the hollow component *Sch*, the opening and closing movements of the tongs were effected. The relative movement of the tongs and of the hollow component was thus accomplished as the result of braking. However, it is not possible always to maintain the brake uniform, because according to the temperatures in the operating room the friction between the brake block and the co-operating face varies; it also varies depending on the time that the machine has been in operation. Further, by the braking action, a part of the power of the lever H is consumed uselessly and the operation of the machine rendered more difficult.

These drawbacks are avoided by the

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present invention whereby the necessary power for riveting is substantially reduced by reason that the relative shift of the two die components is effected by two distinct cam tracks.

As in riveting machines a powerful riveting pressure is necessary, normally the linkages starting from the two cam tracks must be kept very solid. In order now to avoid expensive construction of the machine and to limit its dimensions, the construction according to the invention is so contrived in a manner that the main pressures occurring during the riveting process are taken up by one cam and the linkage elements co-operating therewith. These linkage elements may serve for controlling one die component, e.g., the outer hollow component and may be regarded as a main control linkage. To this main control linkage is articulated an auxiliary control linkage for controlling the second die component, e.g., the tongs. Elements of both linkages have a common stationary fulcrum about which they perform rocking movements derived from the cam track of the main control.

The cam track of the auxiliary control is so formed that it permits intermittently the rocking movement of members of its linkage by the main control without the relative position of the two components being influenced. Periodically, however, it effects relative displacement of the two die components. In this way the relative movement of the two die components is effected without unnecessary braking loss.

The relative movements of the two die components must be exactly adjusted in relation to one another. For this purpose there is incorporated in the auxiliary control an adjustable part with the aid of which the correct relative position of the two die components is attained. Further, there is incorporated in the auxiliary control a yielding arrangement to compensate for fluctuations in the strength of the material to be operated on.

Preferably the travel of the hollow die component is effected by the main control while the auxiliary control is connected with the tongs, there being provided on the hollow die component a stop against which the tongs can bear with a counter stop under spring pressure.

If the arrangement is so contrived that the auxiliary control is not in continuous engagement with its cam then unnecessary friction and unnecessary wear are avoided.

The invention is illustrated by way of example in the accompanying drawings in which Fig. 1 is a side elevation of the device, and Fig. 2 shows the previous arrangement of the braking device.

On the machine shaft 1 there is fixed a cam 2 presenting a cam groove or track 3 with which co-operates a follower roller 4. This roller 4 is mounted on one end of a double-armed lever 5 of the main control means, said lever 5 being pivoted on the stationary fulcrum 6. The lever 5 has at its forwarding end an orifice 7 for reception of a pin 8 which serves as a fulcrum for a bell-crank lever 9 of the auxiliary control.

The pin 8 serves also as a pivot for links 10 which are arranged at both sides of the lever 5 and which are also pivotally connected with lugs 11 of the hollow die component 12, in which the other component 13 functioning as tongs or as pincers is movably mounted.

On rotation of the shaft 1 the cam 2 also rotates. Depending on the form of the cam track 3 the lever 5 is rocked about the stationary fulcrum 6. The forward end of the lever with the pin 8 performs a vertical reciprocating movement and being connected with the hollow die component 12 by the links 10 imparts vertical reciprocating movement to said die component 12.

The cam 2 presents also a peripheral cam track 14 with which co-operates a follower roller 15. This roller 15 is mounted on one end of a double-armed lever 16 which is also pivoted on the stationary fulcrum 6. To the other end of the lever 16 is pivotally connected a connecting rod 17 also pivotally connected to the bell-crank lever 9. In known manner, by means of a turnbuckle, the length of this connecting rod may be varied. A spring is likewise associated with the connecting rod 17 which forms a yielding element of the auxiliary control. The bell-crank lever 9 is bifurcated at its forward end, there being pivotally connected to the fork elements 18 connecting links 20 which carry between them a pin 22. This pin 22 passes through the die components 12 and 13, there being formed in the die component 12 an elongated slot 23 which permits a certain freedom of movement of the pin 22 relatively to the component 12. Between the pin 22 and the component 13 there is no play but the pin 22 can turn readily in an orifice formed in the component 13.

The auxiliary control which operates the component 13 thus comprises the lever 16, the connecting rod 17, the bell-crank lever 9 and the links 20, with the pin 22. The movement of the pin 22 is effected by the cam edge 14, being so controlled

that the follower roller 15 is only intermittently displaced. By this intermittent displacement there is effected relative movement of the die components 12 and 13. The hollow die component 12 then bears with its coned face 24 against the similarly coned face 25 of the tongs element and thereby effects the compression of the jaws of the tongs or the opening of the jaws, depending on the direction of the relative movement.

Provided on the lever 16 is a lug 26 to which is connected one end of a spring 27 so arranged that it tends to rock the lever 16 in counter-clockwise direction. Thereby the connecting rod 17 is urged forward, and thereby the bell-crank lever 9 is moved to depress its forked arm. The fork elements 18 in turn transmit their movement to the links 20, and to the pin 22, which latter travels downwardly until it bears on the lower end of the slot 23. When, now, by means of the cam 3 and the main control gear 5—10, there is effected downward movement of the die component 12 also the component 13 with the tongs travels downward.

Relative movement of the tongs and the hollow die component occurs only when the lever 16 is rocked by the cam edge 14. The cam edge 14 is of such form that it permits intermittently rocking of the lever 16 of the auxiliary control without varying the relative position of the components 12 and 13. Depending on the requirements of operation it co-operates periodically with the roller 15 and the lever 16 to effect the relative movement between the two die components 12 and 13.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A device for effecting the relative displacement of the two die components of a riveting machine of the type comprising an outer, hollow die component housing an inner split-die component used, for example, for securing the spherical stud member of a press button fastener to a fabric, characterised in that the relative displacement of the two die components (12, 13) is effected by two distinct cam tracks.

2. A device as claimed in claim 1, further characterised in that the linkages which co-operate with the two cam tracks (3, 14) and which effect the movement of the die components are articulated to one another and include a common stationary fulcrum (6) around which levers forming members of the linkages perform movements controlled substantially by one cam track (3).

3. A device as claimed in claim 1, further characterised in that the one cam track (14) is so formed that it permits the rocking of the members of the auxiliary control means by the other cam track (3) without influencing the relative position of the two die components (12, 13) and intermittently effects relative displacement of the two die components.

4. A device as claimed in claim 1, further characterised in that the auxiliary control which permits relative displacement of the die components (12, 13) incorporates a yielding arrangement (17).

5. A device as claimed in claim 1, further characterised in that the main control operates a hollow outer component (12) and the auxiliary control operates tongs forming an inner component (13), there being provided in the hollow component a slot (23) against which the tongs can bear with a pin (22) under the pressure of a spring.

6. A device as claimed in claim 1, further characterised in that the follower (15) of the auxiliary control is not permanently in engagement with its respective cam track (14).

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FIG. 1.

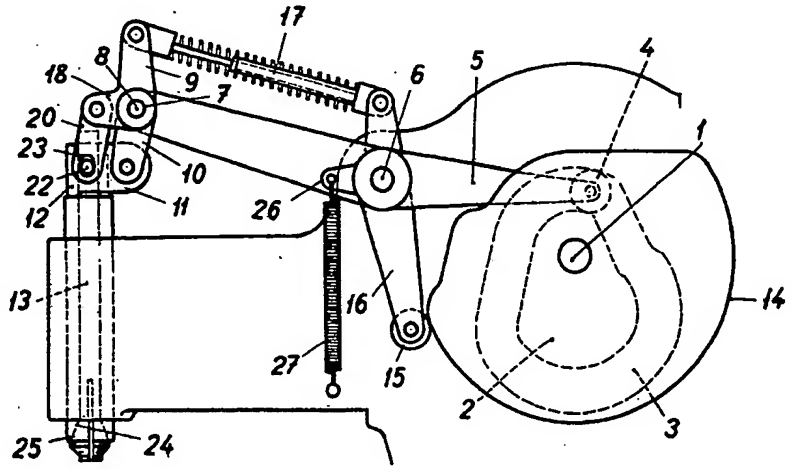
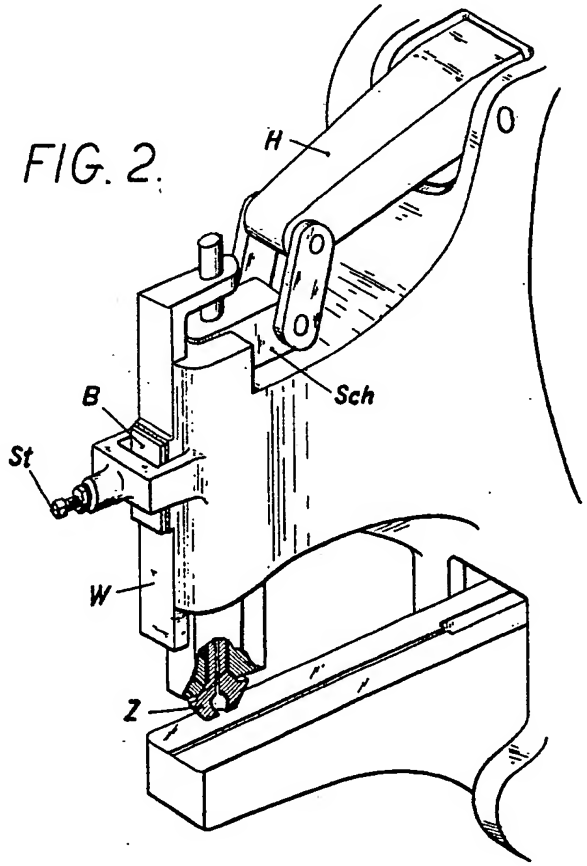


FIG. 2.



[This Drawing is a reproduction of the Original on a reduced scale.]

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